

FLOOR AND CEILING RECEIVING TRACKS FOR SEATING  
INTERCONNECTING METAL STUDS EXHIBITING  
DIAMOND SHAPED APERTURES

CROSS-REFERENCE TO RELATED APPLICATION

5           The present application is a continuation-in-part of U.S. Application Serial  
No. 10/728,271 filed December 4, 2003 for "Floor and Ceiling Receiving Tracks for  
Seating Metal and Wood Studs and the Like and Which in Particular Includes  
Spaced-Apart Punch Holes Along First and Second Sides Thereof."

BACKGROUND OF THE INVENTION

10       FIELD OF THE INVENTION

          The present invention relates generally to stud receiving tracks and panels for  
use in building construction. More specifically, the present invention discloses a  
track receiving and seating system further incorporating interconnecting metal studs.  
Each of the ceiling and floor tracks, as well as the interconnecting wall studs, exhibit  
15       diamond shaped cut-out apertures and which provide a variety of advantages,  
including ease for running conduit and pipes through track and walls and over/under  
windows and doorways, as well as reducing metal content and shipping weight.

DESCRIPTION OF THE PRIOR ART

          The prior art is well documented with various types of structural support and  
20       attachment systems. A first example of this is set forth in U.S. Patent No. 6,418,694,  
issued to Daudet, and which teaches a floor system and method of construction for

assembling a joist support. Of note, the system includes a joist rim that has at least one attachment tab integrally formed therein and to facilitate attachment of a joist to the joist rim. Reinforcing tabs are provided adjacent to the attachment tabs for providing desired structural integrity to the attachment tab connection.

5           The Daudet system also includes a C-shaped joist that has a plurality of oval-shaped openings therein to enable components such as ducts, wires, piping, etc., to pass through. The joists are further provided with mounting holes that are adapted to accommodate wire retainer members for supporting insulation between respective joists. The system may also include preformed blocking members that are sized to  
10       extend between adjacent joists and be attached thereto to provide lateral support to the joists.

          U.S. Patent No. 5,669,194, issued to Colosanto, teaches a structural system for supporting a building and which includes a plurality of prefabricated lightweight steel framed bearing wall panels supporting hollow core concrete slabs which are joined  
15       with grout. The invention includes improved devices for attaching exterior finishing to exterior bearing walls without requiring a studded non-bearing exterior wall. In relevant part, the exterior finish mounting device includes a deck stud channel which is mounted to a reinforcing bar by a channel clip and secured in grout by a gusset plate with a hole in it. The exterior finish is attached to the stud channel by screws  
20       which are also secured in the grout. Flat metal straps welded to the tops of double studs eliminate the previously used threaded members with angled bearings, nuts and

washers. The studs are ground at their ends to fit more perfectly within tracks and avoid the need for bearing plates. An open slide clip replaces the former splice member to allow for more latitude in positioning reinforcing bars and providing a better surface area for grout.

5 U.S. Patent No. 4,394,808, issued to Thorsell, teaches a fastener including a combination of a gang nail plate and a clip. The plate is driven into a gypsum board panel to attach itself thereto. The clip connects with the plate and extends beyond its side edge. A screw or nail is driven through an aperture in the protruding end of the clip and in order to secure the panel to a supporting stud. The gang nail plate includes  
10 tangs protruding from the inner face thereof and a slot-forming transverse member protruding from the outer face. The clip is a flat, rectangular, spring steel plate formed with an upwardly inclined inner end, a flat outer end, and a downwardly inclined central portion. The clip's inner end is wedged into the slot to tightly connect the panel, plate and clip.

15 U.S. Patent No. 4,573,302, issued to Caretto, teaches a method of constructing a housing development in which the necessity for taking repetitious measurements and re-measurements through the various stages of construction is minimized. A construction surface in the form of the floor of a school or building in a shopping center associated with the housing development is initially established. Full scale  
20 dimensionally-stable, flexible templates are used at each building site location to

mark the foundation footings and plumbing trenches required for the houses to be built.

In relevant part, and referencing Fig. 8 of Caretto, a wall section is constructed by an open rectangular frame constructed of front, back and end members. Upper and lower extending L-shaped members in particular include carriage bolts extending  
5 upwardly through horizontal surfaces thereof. Horizontal plates are attached by means of nuts in a conventional fashion to securely fasten the plate to the frame on all four sides of the house.

Additional examples drawn from the prior art include Horton, U.S. Patent No. 5,596,859, which teaches a metal wall stud in the shape of an elongated open channel  
10 having pre-punched nail or screw holes and pre-punched passageways for electrical or plumbing facilities. Integral tabs extending beyond the ends of the stud walls are foldable to provide connections to wooden plates or metal wall stud purlins in the construction framing. Split tabs integral with the bottom wall of the channel provide  
15 lateral stabilization, greater uplift loads, and the capability of being load bearing. A pair of studs have nesting capability to provide telescopic adjustability for walls in a vaulted ceiling room.

Barenburg, U.S. Patent No. 4,919,164, discloses a method of installing piping, ducts and conduits in a prefabricated framed wall for a building structure and  
20 partition made thereby. The steps include cutting at least one hole through each of a plurality of frame studs, a top frame plate and a bottom frame plate. Additional steps

include aligning the plurality of frame studs, securing tops of the frame studs to the top frame plate as well as bottoms to the bottom frame plate, installing plumbing pipes between the frame studs and inserting either a sanitary tee or a waste pipe connector or a heating/cooling duct through the holes in the bottom frame plate so  
5 that they depend therebelow.

U.S. Patent No. 4,691,494, issued to Gwynne, teaches a metal framing system for building structures and in which the members exhibit continuously roll formed and fabricated T-shaped, C-shaped and I-shaped cross sections and wherein the flanges at their distal edges excluding plate members include a roll formed multi-  
10 purpose end and surface fastener recess extending the length of the member. These recesses are adapted to supportedly receive threaded fasteners for use in conjunction with both interconnection of pre-punched transverse plates at the ends of the members and also for attachment of wall covering against the flanges of the members.

Potter, U.S. Patent No. 6,481,175, teaches a structural member including a  
15 web portion having a plurality of triangular regions to provide additional strength and stiffness. The triangular regions are recessed from the web and may have a floor area or the floor may be cut out to provide apertures with lip portions. An additional element secures a flanged bracing panel in the opening between the studs and the top and bottom plates of a building frame and clads both sides of the braced frame.

20 White (5,081,813) discloses a metal wall frame structure with U-shaped top and bottom channel plates and further including pluralities of paired and inwardly

directed tabs arrayed along each of the side walls. Lynch, Jr. (U.S. Patent No. 5,537,714) teaches a metal stud grommet arrangement of note.

### SUMMARY OF THE PRESENT INVENTION

The present invention discloses a track system for assembling a wall structure.

5 In particular, the present invention is an improvement over prior art wall structures in that it incorporates iteratively spaced and polygonal shaped cut-out portions which both reduce shipping weight and material content of the inter-engaging track members as well as facilitating the running of plumbing lines and electrical conduit throughout.

10 In a first preferred embodiment, each of upper and lower extending and elongated track bodies are provided and each exhibits a substantially "U" shape in profile, with a bottom extending face and first and second interconnecting and upwardly extending sides. A plurality of polygonal shaped apertures are defined in axially extending fashion along the bottom extending face of each of the upper and  
15 lower extending tracks, as well as throughout vertically extending and interengaging metal studs. Preferably, the apertures are diamond shaped but can be configured into other multi-sided shapes, ranging from a three-sided triangle to a polygon exhibiting an infinite number of sides (i.e., a circle).

A further plurality of circular apertures are defined in each of the extending  
20 sides, in aligning fashion and between first and second extending ends of each of the bodies. Each of the pairs of apertures exhibit a specified diameter, a centerline

location of each side extending aperture being spaced apart, in a preferred variant, a distance of four inches.

Pairs of extending tabs are defined from cutout portions taken from the bottom extending face of each elongated body. Each of the pairs of tabs are arranged in spaced-apart and opposing fashion and such that a center point between the pair of tabs is in alignment with a selected pair of side extending apertures. In a preferred embodiment, the pairs of tabs correspond to sixteen inch on-center spacings along the upper and lower extending bodies.

Each of the bodies further includes, in a preferred embodiment, a lip edge extending from at least one end of the bottom extending face. The extending lip edge engages a succeeding body placed in end-to-end extending fashion and may include one or more apertures for engaging an overlapping lip edge of a succeeding track and for receiving fasteners for securing the tracks together as well as to a floor or ceiling location.

A further variant teaches the application of an indicia scheme, such as numbering, between first and second ends of the elongated body. In particular, a twelve foot running length of elongated channel will include one foot numerical indications (ranging 1-12 feet), on one side thereof, whereas an opposite side will possess the same indicia in reverse order.

In assembly, selected ends of the plurality of extending studs are seated upon the bottom extending face, between the pairs of upwardly extending tabs, and in

substantially center aligning fashion between the selected pairs of apertures. At this point, fasteners are inserted through the apertures for securing the studs to the upper and lower extending bodies.

5 In a further preferred embodiment a plurality of identically configured receiving tracks each include an elongate extending body having a central extending face, and first and second interconnecting and elongate extending side faces and angled end faces. A plurality of polygonal shaped apertures are defined in axially extending fashion along a selected face of said body and at preselected intervals between first and second ends. A plurality of circular shaped apertures are defined in  
10 the extending sides, in aligning fashion and between the first and second extending ends.

Each of a plurality of elongated bodies are arranged in parallel spaced apart fashion upon a level wall surface, prior to fasteners engaging through the circular shaped apertures. The polygonal shaped apertures provide passageways for at least  
15 plumbing and electrical conduit lines.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Reference will now be made to the attached drawings, when read in combination with the following detailed description, wherein like reference numerals refer to like parts throughout the several views, and in which:

20 Fig. 1 is an environmental perspective illustration of an assembled track system defining a wall structure and including spaced-apart floor and ceiling



receiving tracks, between which are seated a plurality of vertically extending stud members according to the present invention;

Fig. 2 is a sectional perspective of a selected wall track and which illustrates in particular the polygonal shaped apertures defined along the bottom extending face;

5 Fig. 3 is a perspective illustration of a hat track according to a second preferred embodiment of the present invention;

Fig. 4 is an environmental view illustrating the manner in which a plurality of the elongated hat tracks are secured upon a wall surface prior to application of electrical and plumbing conduit and an overlaying wallboard material;

10 Fig. 5 is a sectional perspective of a floor or ceiling receiving track and which illustrates an extending lip edge and cut-out tabs associated with a bottom extending face; and

Fig. 6 is a sectional perspective of an interconnecting metal stud, with diamond shaped apertures, and further illustrating in exploded fashion an assembleable stud grommet for facilitating passage of conduit between spaced apart studs.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to Fig. 1, an environmental view is illustrated at 10 in perspective of a track receiving and seating system for assembling a wall structure.

20 In particular, the present invention discloses a plurality of individual components which, upon assembly, form a wall structure for supporting wall covering material,

fixtures, and which further facilitates ease of installation of such as plumbing lines and electrical conduit.

Referring again to Fig. 1, an upper track receiving channel is illustrated generally at 12 and a corresponding lower track receiving channel is illustrated by sections 14 and 16, which are separated by an open doorway enclosure 18. Each of the upper 12 and lower seating 14 and 16 tracks define an elongate extending and substantially “U” shaped body arranged in parallel opposing and spaced apart fashion. In particular, ceiling track 12 includes a bottom extending face 20 with first 22 and second 24 extending sides, whereas selected floor track 16 likewise includes a bottom extending face 26 and first 28 and second 30 extending sides.

As further referenced in Fig. 1, a plurality of polygonal shaped apertures 32 are formed through the bottom face (see such as at 20) of the selected track 12 and at spaced apart intervals along its axial length (from end to end). In the illustrated preferred embodiment, the apertures 32 are diamond shaped, however it is understood that they can be of any polygonal configuration (ranging from triangular to multi-sided).

A plurality of interengaging metal wall studs are further shown at 34, 36, 38, et seq. in Fig. 1. As with the ceiling 12 and floor 14 & 16 tracks, each of the metal wall studs 34, 36, 38, et seq., are illustrated as three-sided extrusions exhibiting a bottom face and first and second angled side faces. In particular, and further referencing Fig. 2, selected wall track 34 is illustrated in rotated plan view and

includes a bottom face 40 and first 42 and second 44 interconnected and perpendicularly extending sides.

Additional diamond shaped apertures are illustrated at 46 and 48 (see corresponding interior sidewalls defined within bottom face of track 34), defined  
5 through the bottom face 40 of the track extrusion, and an additional triangular shaped aperture 50 is also illustrated. It is also understood that each of the elongated bodies 34, 36, 38, et seq., is further preferably constructed of a steel material, however it is contemplated that other types of material, such as durable and impact resistant plastics, can be employed within the scope of the invention. It is also contemplated  
10 that the desired elongated and “U” channel shape with multiple aperture cutouts may be accomplished by any of a number different manufacturing processes, among these including extrusions, stampings, dies and the like.

Upon assembly, and such as is accomplished by assembling the plurality of vertically extending metal wall studs 34, 36, 38, et seq., at selected locations within  
15 each of the seating channels defined in the ceiling 12 and floor 14 and 16 tracks, the configuration of the multiple aperture cutouts 32, 46, 48, 50 defined in the floor, ceiling and wall tracks provides a number of advantages. Among these are the ease of access for the installation of plumbing lines, see at 52, 54 and 56 in Fig. 1, as well as electrical conduit for providing power to outlet boxes 58 and 60 secured at given  
20 locations to selected metal wall studs. In this fashion, the polygonal apertures

provide the ease of ability for running conduit through the ceiling, floor and wall tracks, as well as over and under windows and doorways.

Additional advantages include the reduction of metal (e.g. 18% in one application) through the punch-out arrangement of the diamond apertures, and such as  
5 at 4" on center spacings in one variant, combined with an attendant reduction in shipping weight. As is also illustrated in Fig. 1, the assembled wall structure is capable of supporting such as a wallboard (drywall) material, see at 62, as well as a sink fixture 64 with extending plumbing line 66.

As is further best shown in Fig. 5, additional pluralities of apertures 68 and 70  
10 are defined in each of extending sides 72 and 74 of a subsection length of floor or ceiling track, see as generally referenced at 76. The apertures are arranged in aligning fashion, and between first and second extending ends of each of the bodies.

For example, pairs of aligning apertures are illustrated at intervals along such as a twelve foot running length of track. Selected apertures on opposite sides align  
15 such that a centerline location of each side is spaced apart, in a preferred variant, in equidistant intervals ranging from such as four inches to, as illustrated, every foot. The selection of four inches would be considered important to a preferred embodiment, in that it equates to multiples of 8", 12", 16", 24", et seq. and which corresponds to the placement of vertically extending wall studs in such as 18" on-  
20 center and 24" on-center intervals and which are generally accepted to be industry standards for assembling interior and exterior construction walls. It is further

understood that other on-center spacing intervals of the rows of aligning apertures are possible, such as including 6" on-center spacings and the like.

Pairs of extending tabs 78, 80 and 82 are defined from cutout portions taken from a bottom extending face of each ceiling and floor track body and such as is  
5 further illustrated at 84 in Fig. 5. Each of the pairs of tabs 78, 80, 82 et seq., are arranged in spaced apart and opposing fashion and such that a center point between the pair of tabs is in alignment with a selected pair of side extending apertures. In one preferred embodiment, the pairs of tabs correspond to sixteen inch on-center spacings along each of the upper and lower extending bodies.

10 The tabs 78, 80, 82 are further formed, in the variants illustrated, from cutout portions taken from the bottom extending face of the selected ceiling or floor elongated body. As is again referenced in Fig. 1, opposite extending ends of selected vertical extending studs 34, 36, 38, et seq., seatingly engage between the selected pairs of the tabs. Upon seating engagement of a selected stud into the opposing  
15 seating channels defined in the upper and lower extending bodies, fasteners (see screws 84 in Fig. 1) are applied through each of the associated pairs of aligning apertures (see again in enlarged view of Fig. 5) and in order to secure the studs 34, 36, 38, et seq., into place in on-center aligning fashion.

As is again shown in Fig. 5, each of the ceiling and floor tracks further  
20 includes, in a preferred embodiment, a lip edge 86 extending from at least one end of the bottom extending face 84 associated with the elongated body. The extending lip

edge 86 can be overlappingly engaged with an adjoining end (not shown) associated with a succeeding body ceiling or floor track receiving body placed in end-to-end extending fashion.

Although not shown, it is understood that nails/screws or the like are  
5 hammered (or otherwise forcibly secured) through apertures 88 defined in the overlapping lip edge and in order to secure the running lengths of the extending channels in secure end-to-end fashion. Although further not shown, it is also understood that two abutting ends of elongated channel can be secured, with only one having an extending lip edge and which would in this instance extend over a level  
10 edge of an associated bottom face.

Referencing again Fig. 5, in one particular variant, the elongated track is produced according to a length of ten feet and includes numerical foot marking indicia ranging from 1-3 along first extending side 72. As illustrated, a reciprocal and reverse numbering scheme extends along the second side 74 as shown by reciprocal  
15 indications 9-12. The numerical indications for 0' and 10' are not shown but are understood to correspond to the opposite ends of the receiving track and such that the track is reversible in use.

It is also contemplated that other numbering or coding indicia schemes can be employed, such including color coding and the like and which employs a repetitive  
20 illustration of four or more colors. It is also contemplated that other lengths of receiving track, such as for example eight foot, twelve foot, etc., can be incorporated,

each with a unique numbering or coding indicia scheme for determining placement of wall studs (not shown) and operating independently or in tandem with the aligned pairs of apertures and/or the opposing tabs.

Referring now to Figs. 3 and 4, in a further preferred embodiment, a plurality  
5 of identically configured receiving tracks are illustrated, see for example as generally illustrated at 90 and 92. As best referenced by track 90 in Figs. 3 and 4, each includes an elongate extending body having a central extending face 94, first and second interconnecting, angled and elongate extending side faces 96 and 98, and associated and angled end faces 100 and 102

10 Pluralities of polygonal shaped apertures 104 and 106 are defined in axially extending fashion along a selected face of said body 90 (such as within angled side faces 96 and 98) and at preselected intervals between first and second ends. Pluralities of circular shaped apertures 108 and 110 are defined in the further angled end faces 100 and 102, in aligning fashion and between the first and second extending  
15 ends.

The end faces 100 and 102 are arranged in substantially parallel fashion relative to the central extending face 94 and such that, upon arranging each body in parallel spaced apart fashion upon a level wall surface 112 (see Fig. 4), fasteners (not shown) engage through the circular shaped apertures to secure the tracks 90 and 92 to  
20 the level wall surface 112 (such as again a basement wall or the like). As illustrated, the polygonal shaped apertures (e.g. 104 and 106) provide passageways for at least

plumbing and electrical conduit lines, see for example conduit wire 114. Additional fasteners 116 (such as drywall screws) are provided for mounting a wallboard material 118 (drywall) upon the tracks, and in particular to seat upon the central extending faces 94 associated therewith.

5           Referring finally to Fig. 6, a sectional perspective is illustrated at 120 of an interconnecting metal stud, with diamond shaped apertures, and further illustrating in exploded fashion an assembleable stud grommet for facilitating passage of conduit between spaced apart studs. In particular, the grommet may be constructed as two assembleable pieces 122 and 124, each including interengaging tangs 126 and 128.  
10       The pieces 122 and 124 assemble through opposite sides of a selected aperture 130 and such that central apertures 132 and 134 assemble and align with the polygonal aperture 130 to facilitate the safe passage of such as flexible electrical conduit and the like.

          Having described my invention, other and additional preferred embodiments  
15       will become apparent to those skilled in the art to which it pertains and without deviating from the scope of the appended claims. In particular it is envisioned that the receiving tracks can be used in variants including either both top and bottom extending lengths or, alternately, would also cover applications in which it is applied to only one of upper or lower ends of the wall construction.

20           I claim: